
Space Shuttle Orbiter and Component Handling

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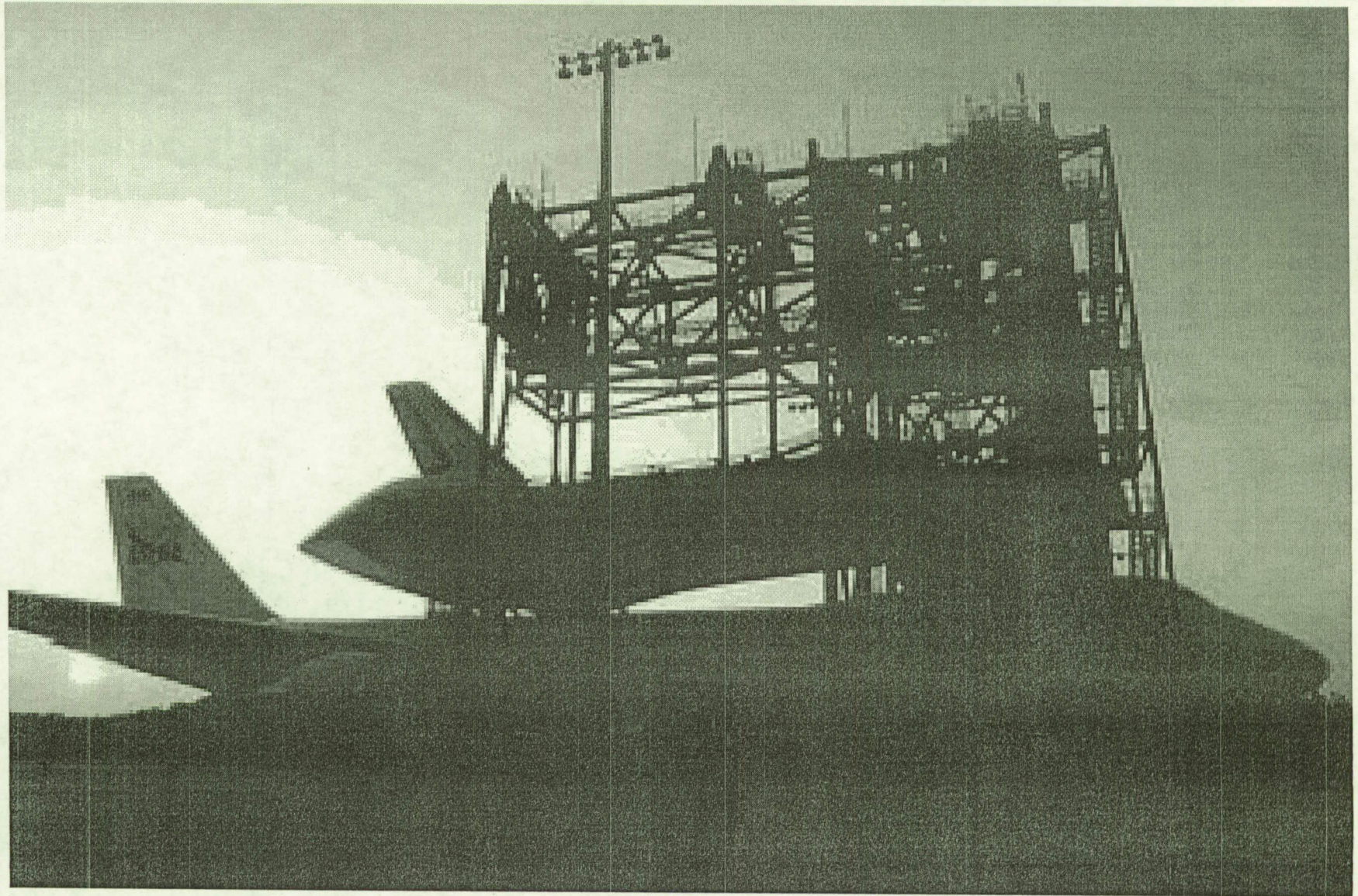
Introduction

- **Who am I?**
 - **17 years in Orbiter Handling Engineering group at United Space Alliance (formerly with Lockheed)**
- **What do I do?**
 - **Responsible for procedures**
 - **Responsible for flight hardware handling policy**
 - **Serve on Move Director Guidance Committee**

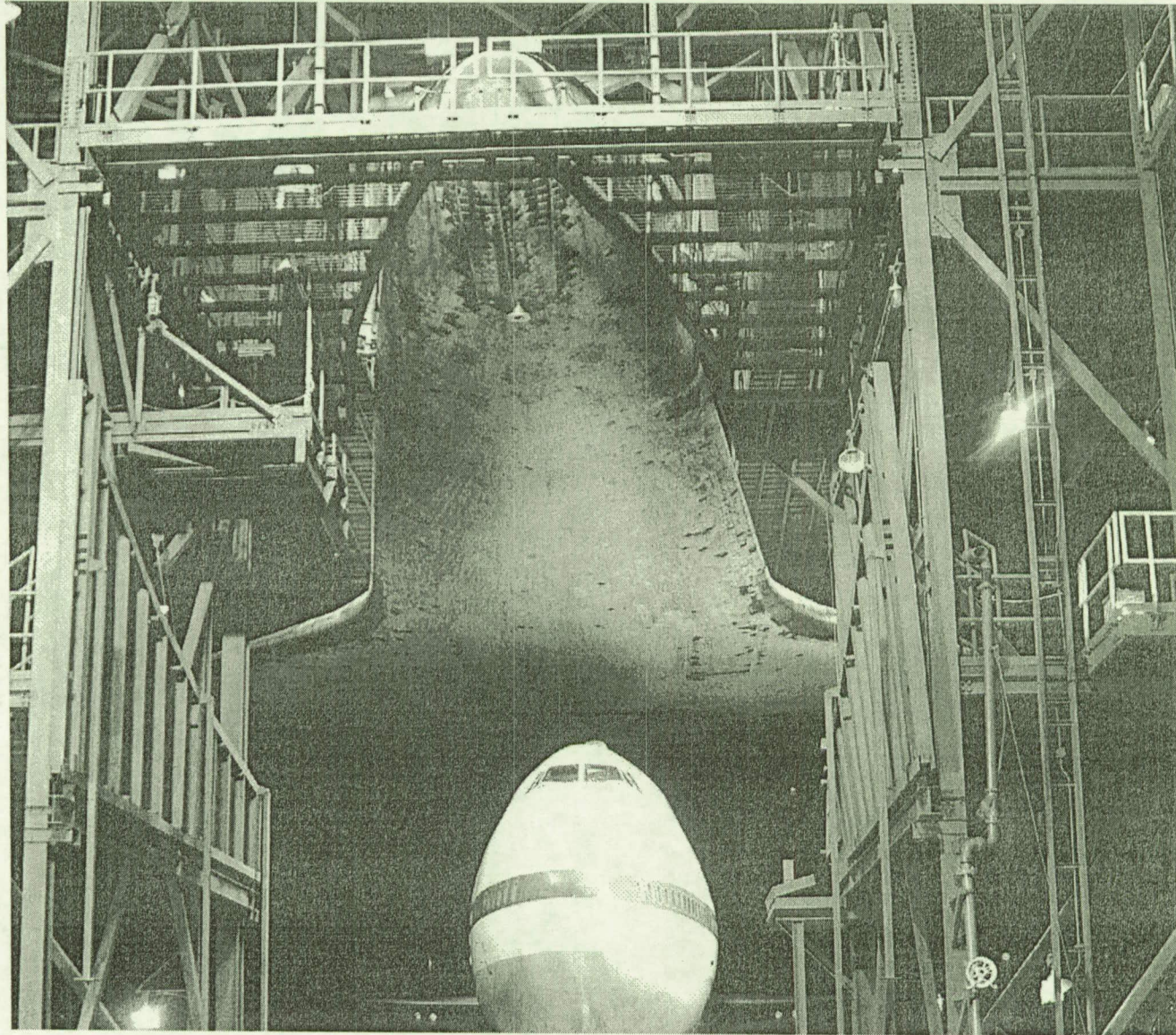
Overview

- Types of moves we do
 - Single crane lifts
 - Dual crane lifts
 - Transportation
- Issues and incidents we have had
- Our policies
- Move Director Oversight and Guidance Committee
- Move director proficiency and training
- Questions?

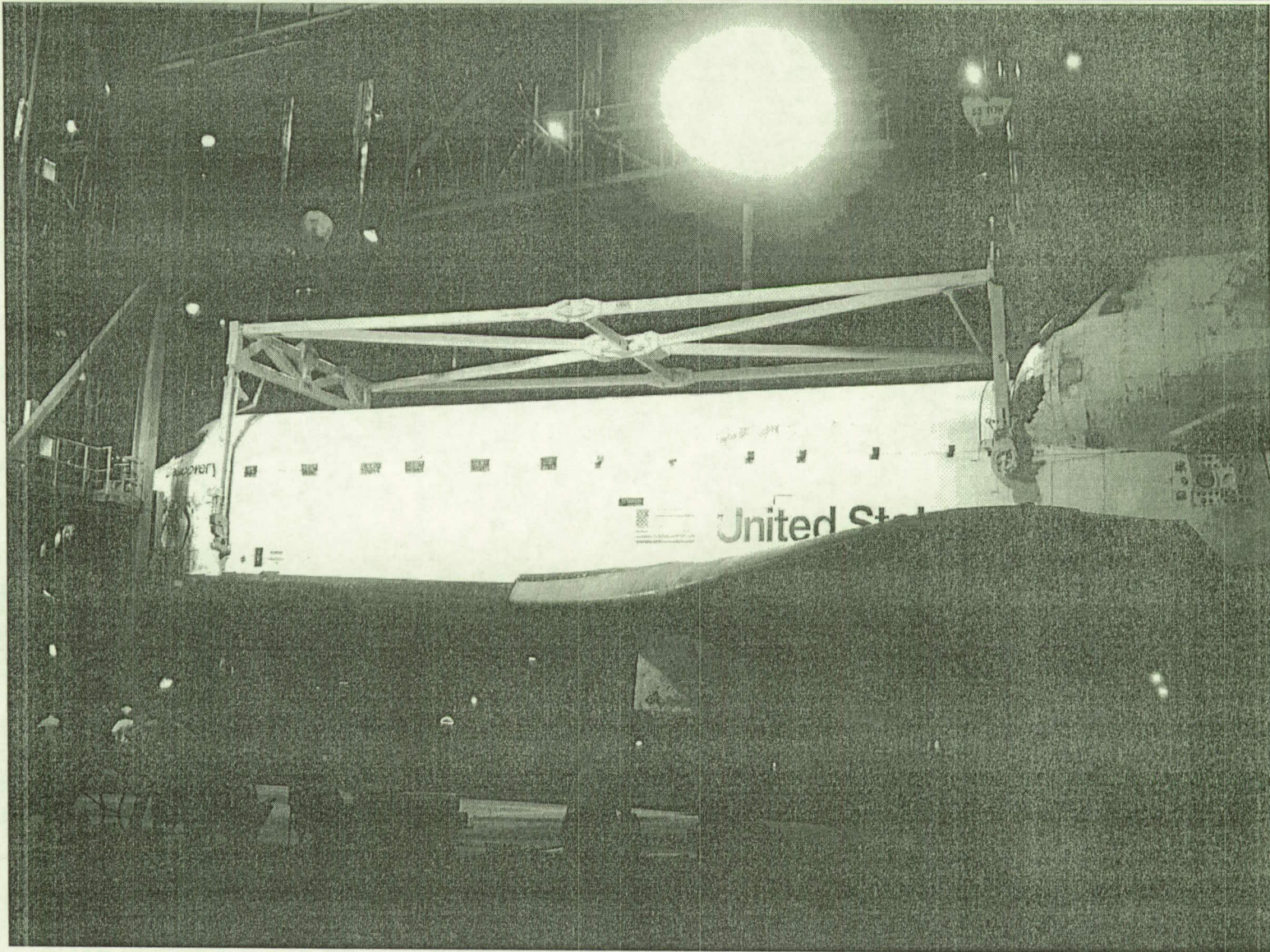
Dual Crane Lifts



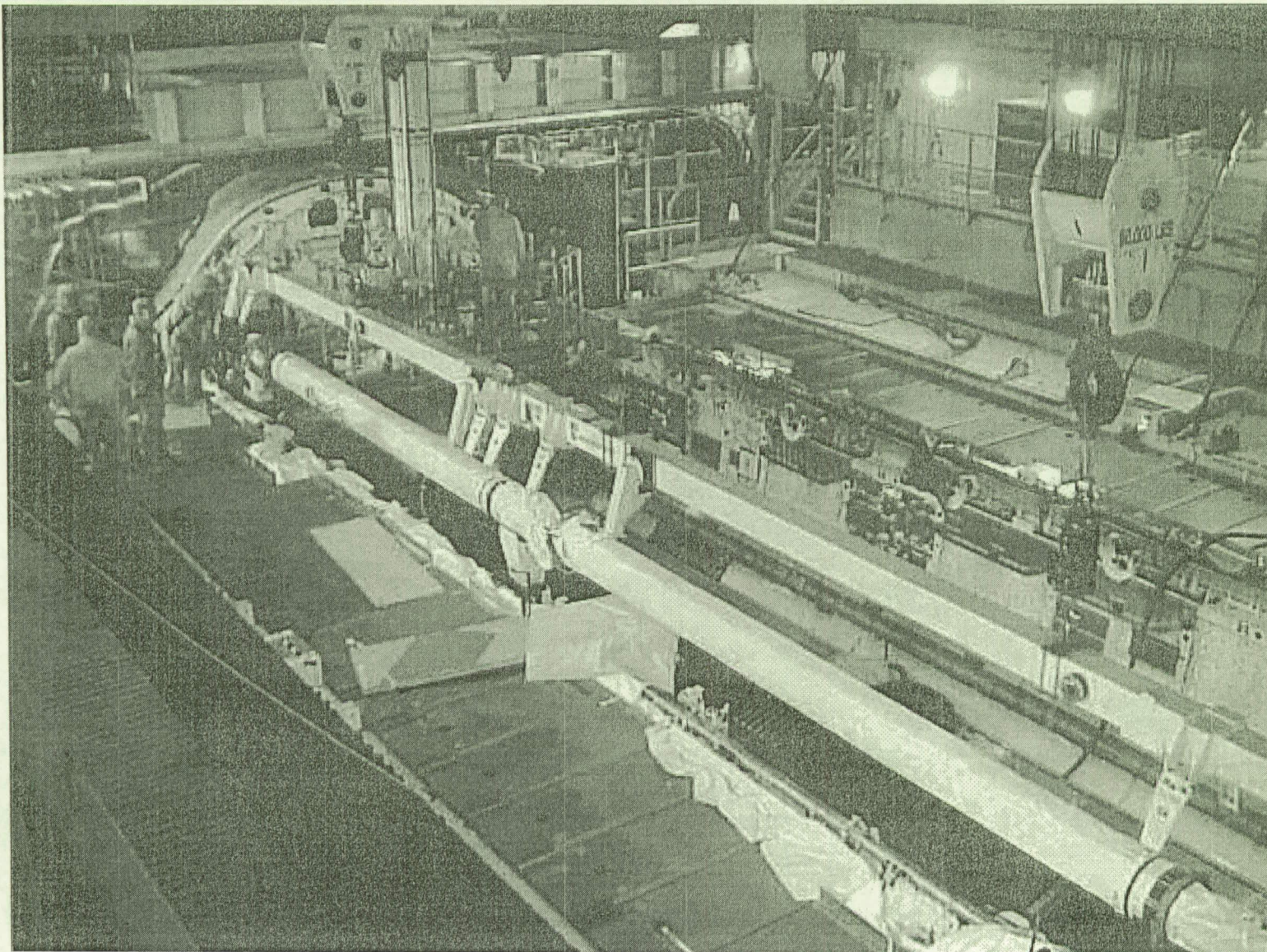
Dual Crane Lifts



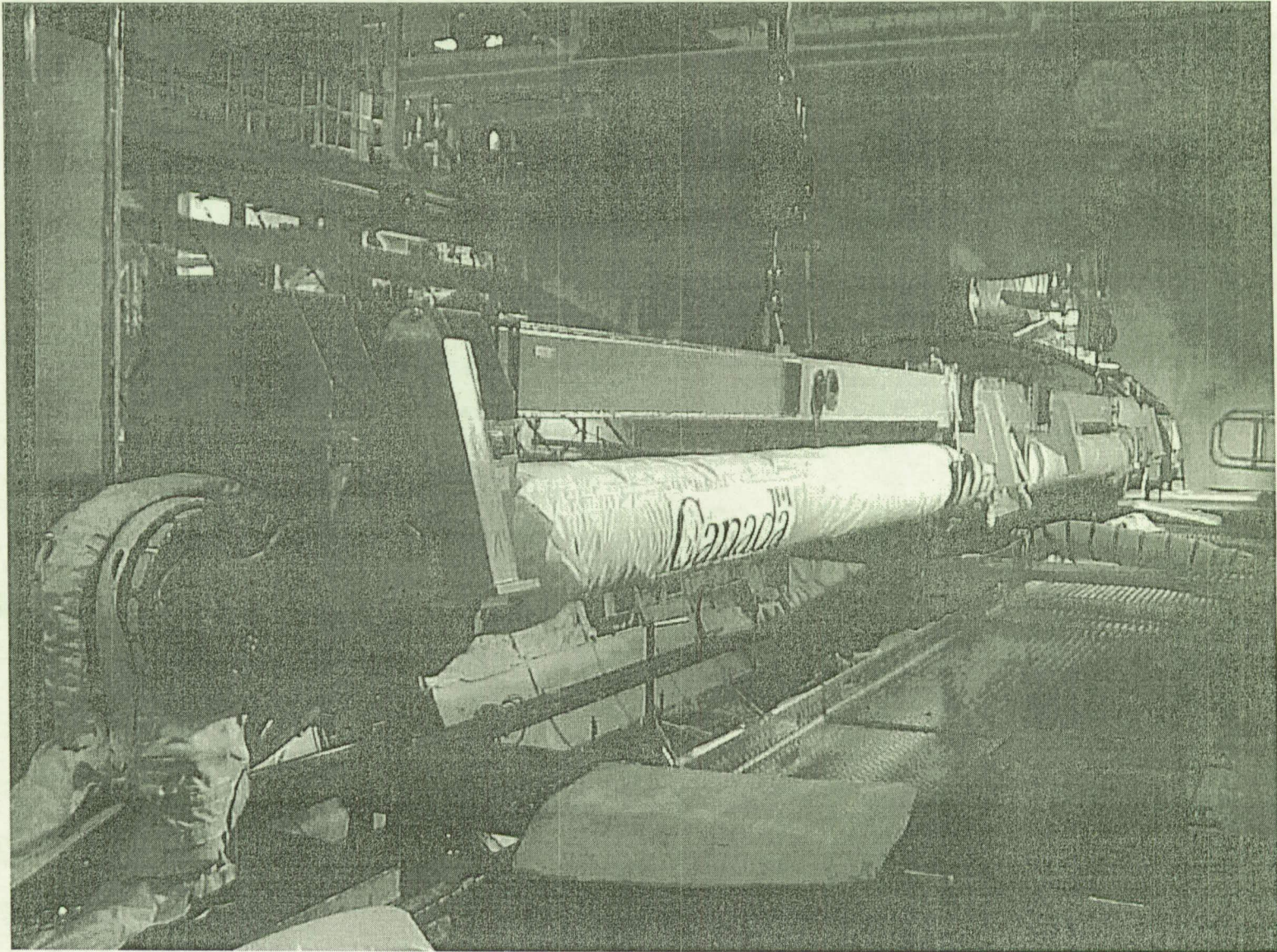
Dual Crane Lifts



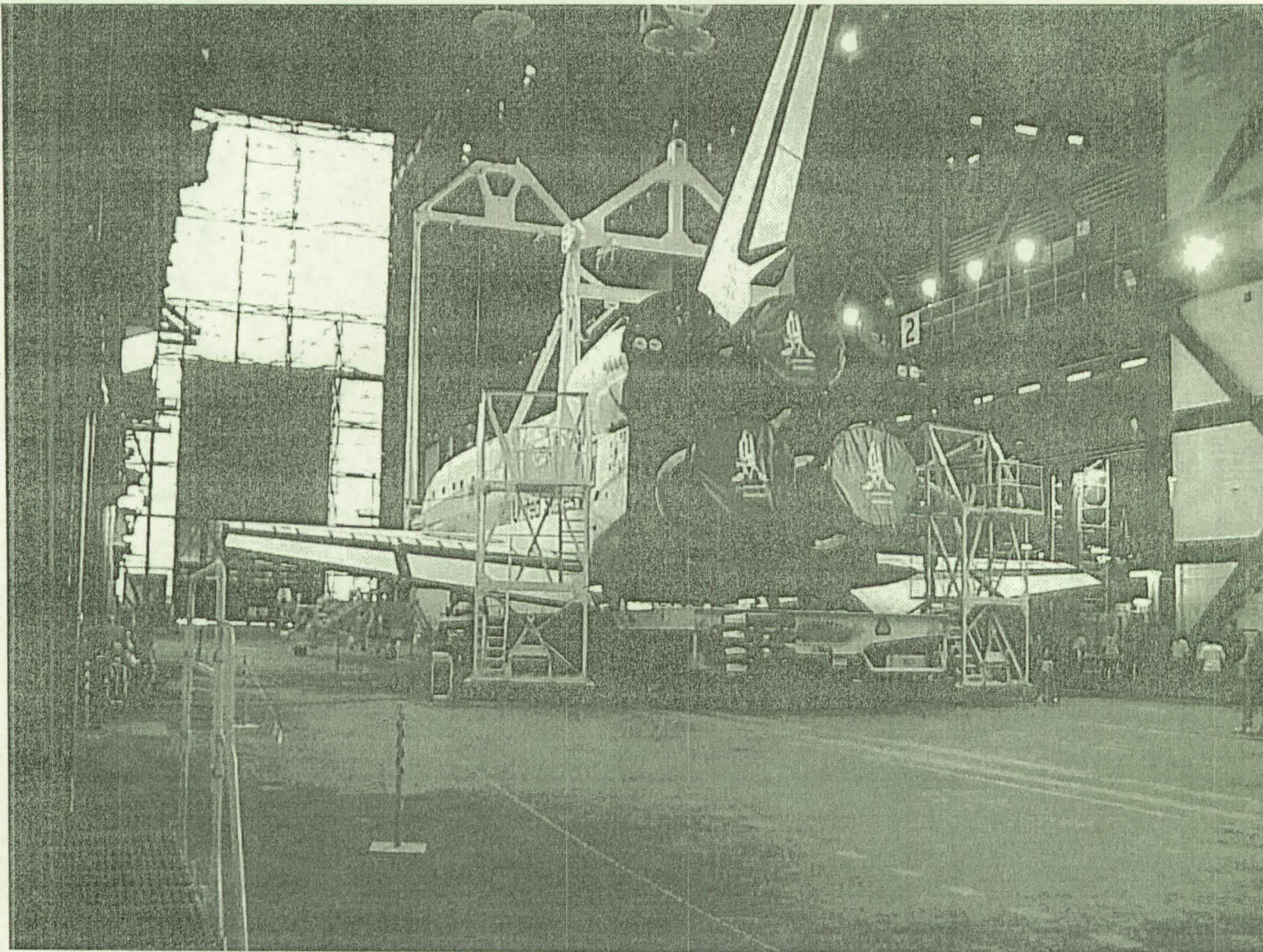
Dual Crane Lifts



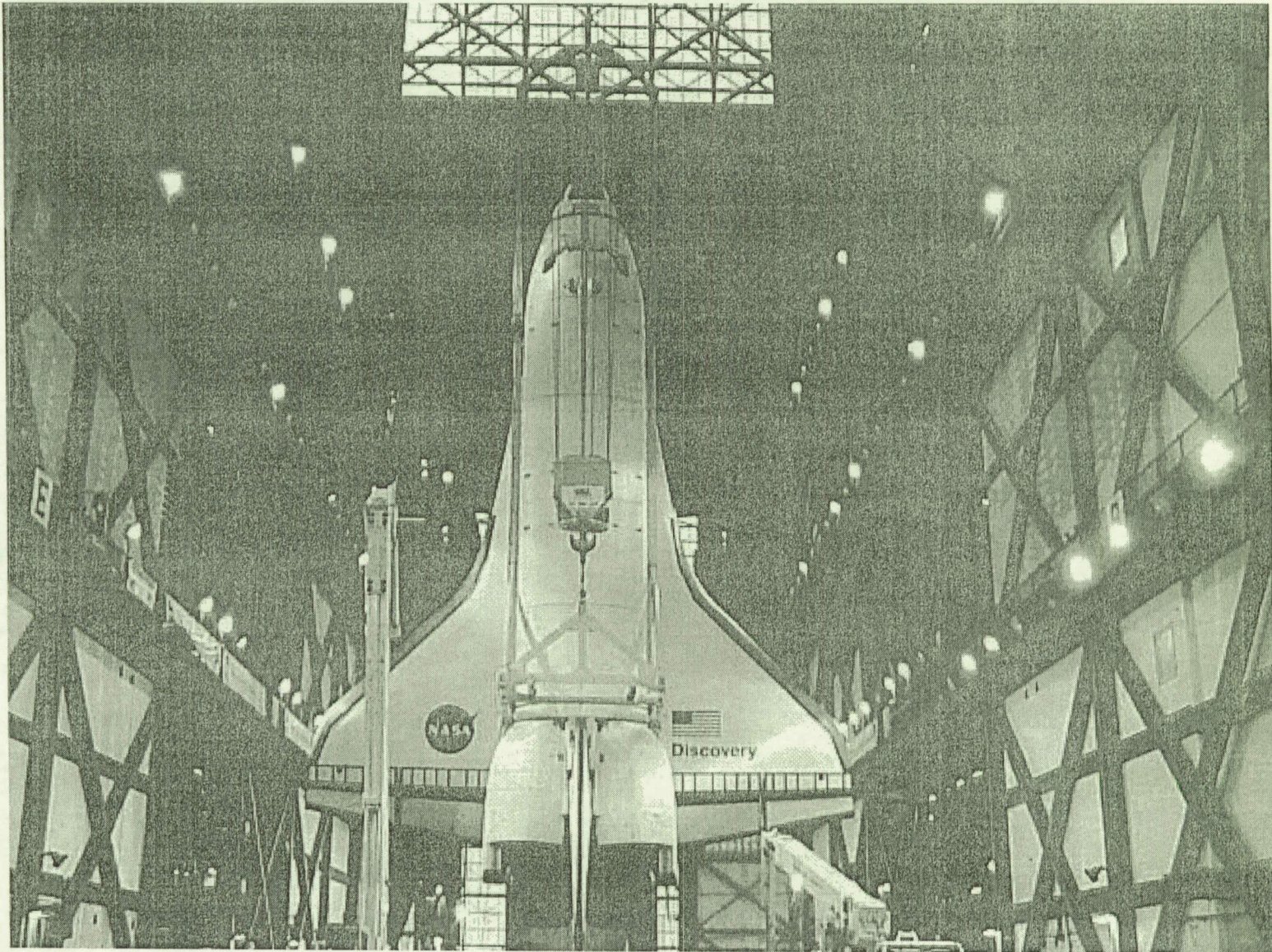
Dual Crane Lifts



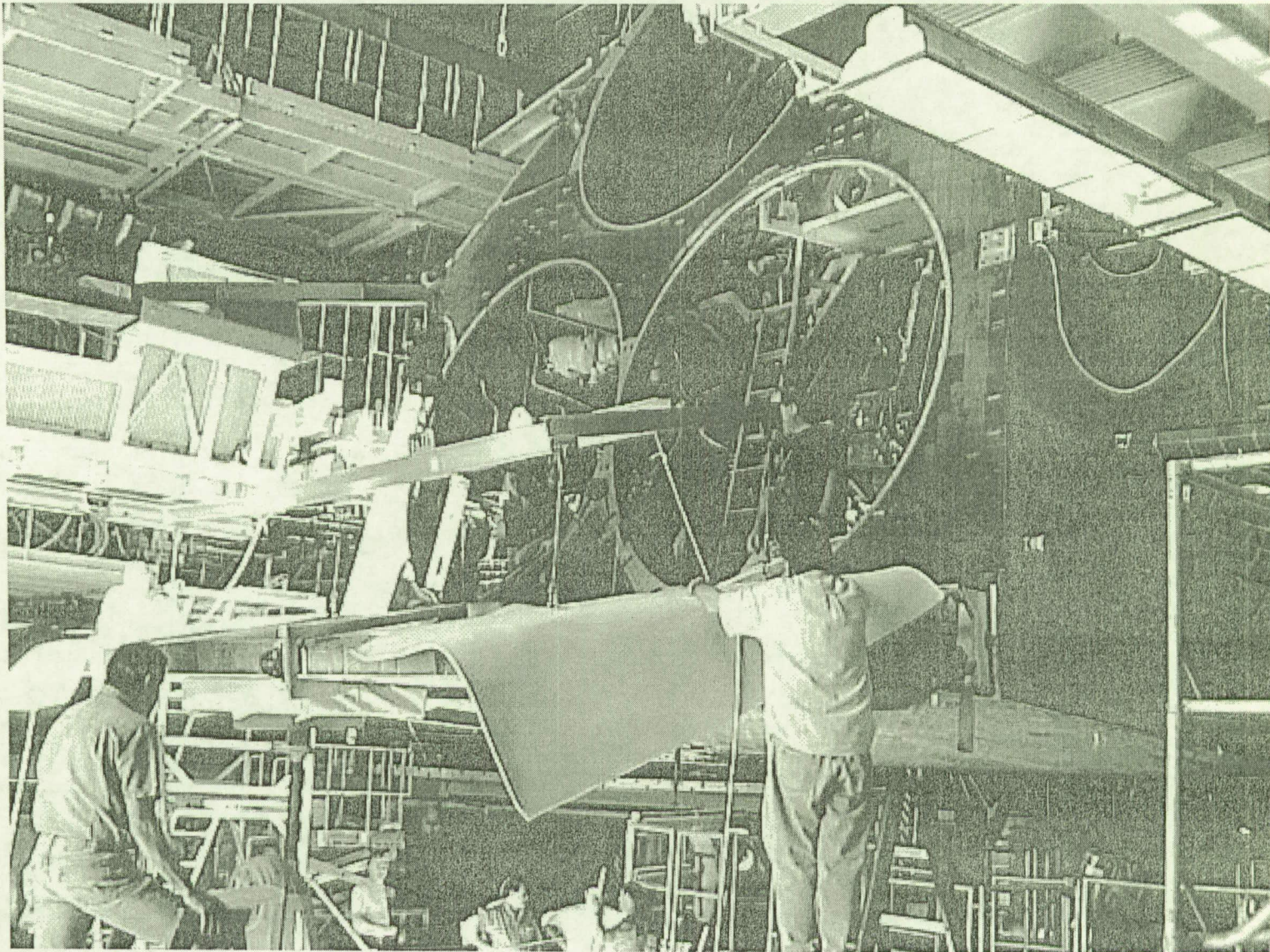
Dual Crane Lifts



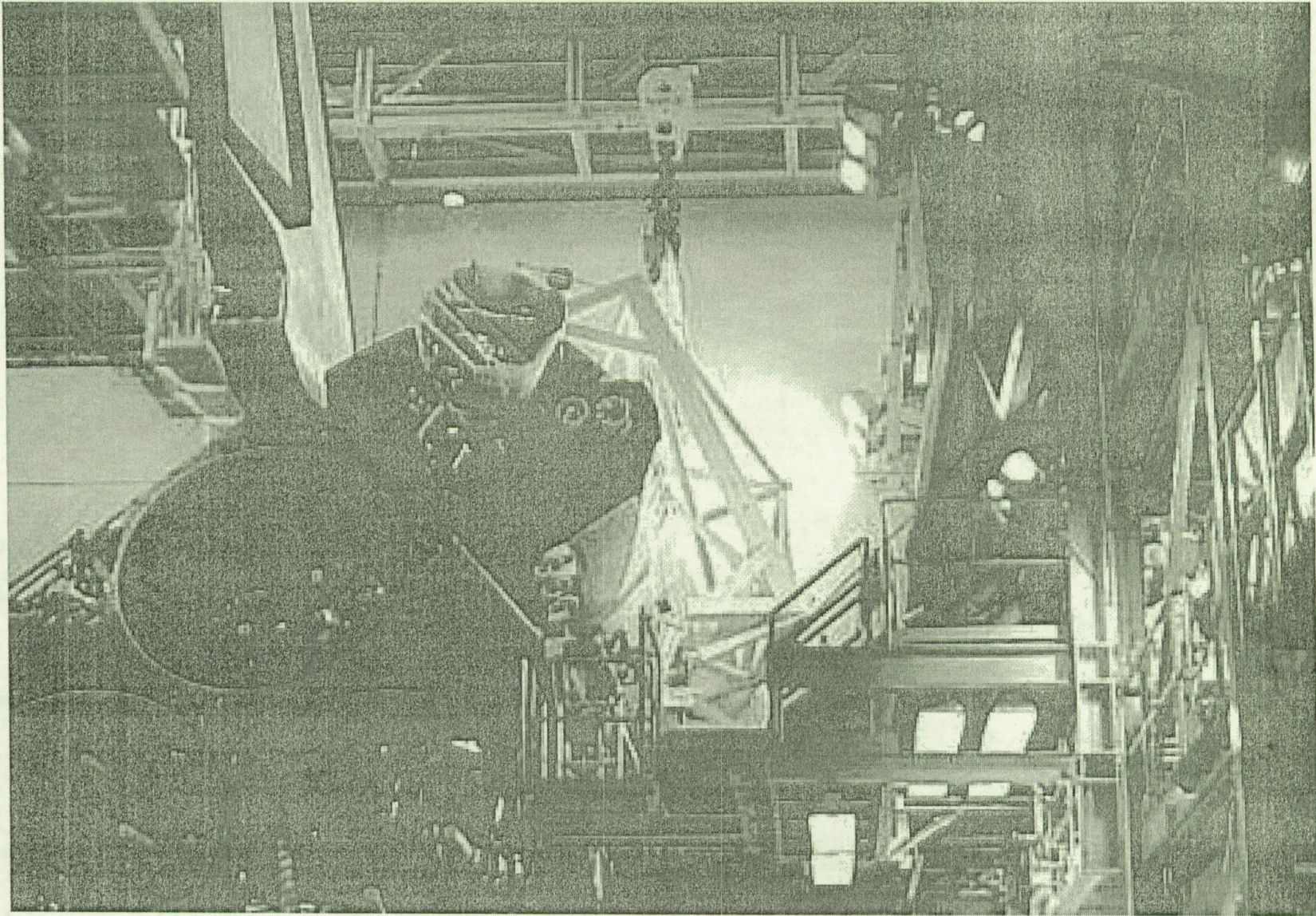
Single Crane Lifts



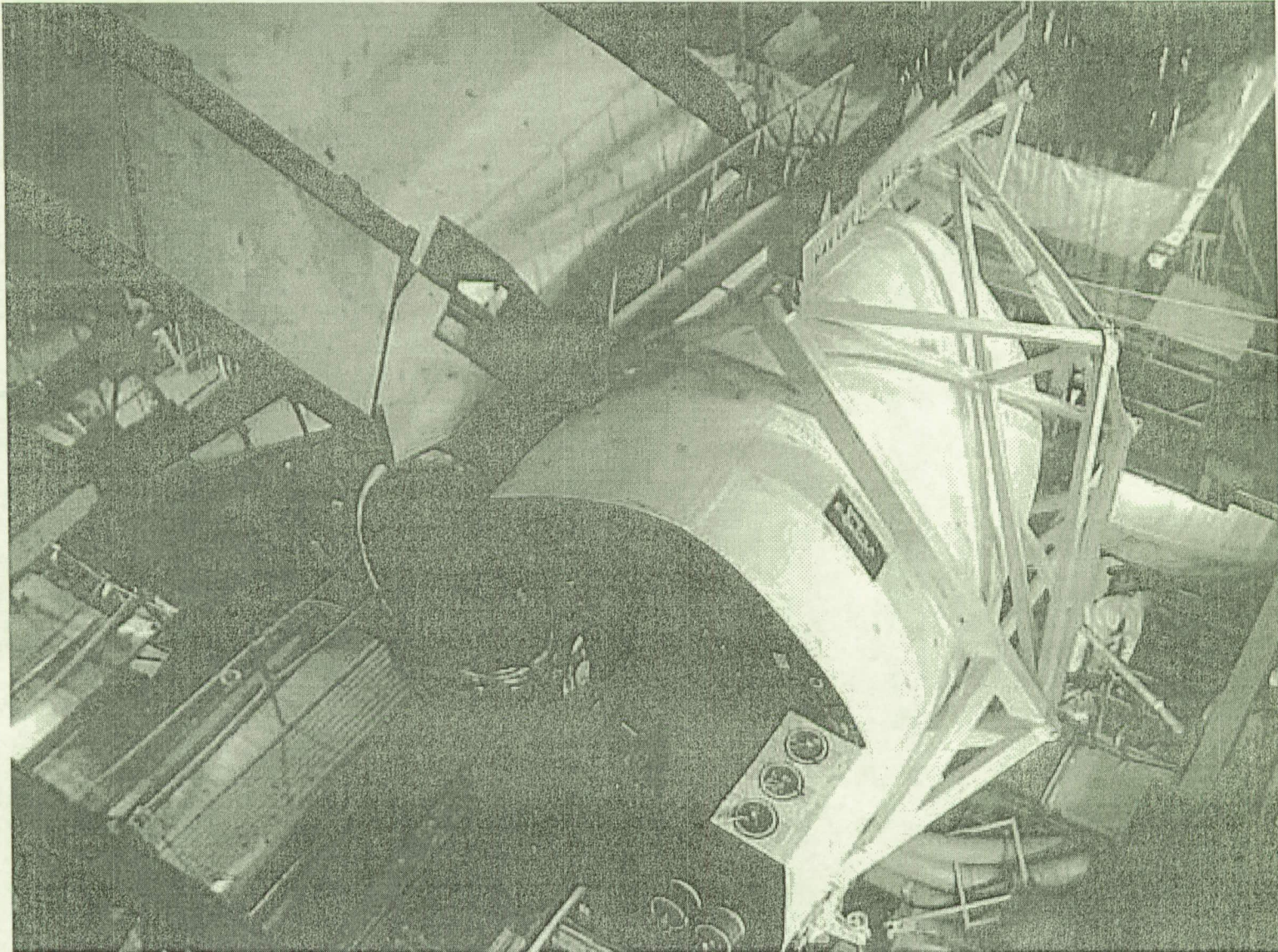
Single Crane Lifts



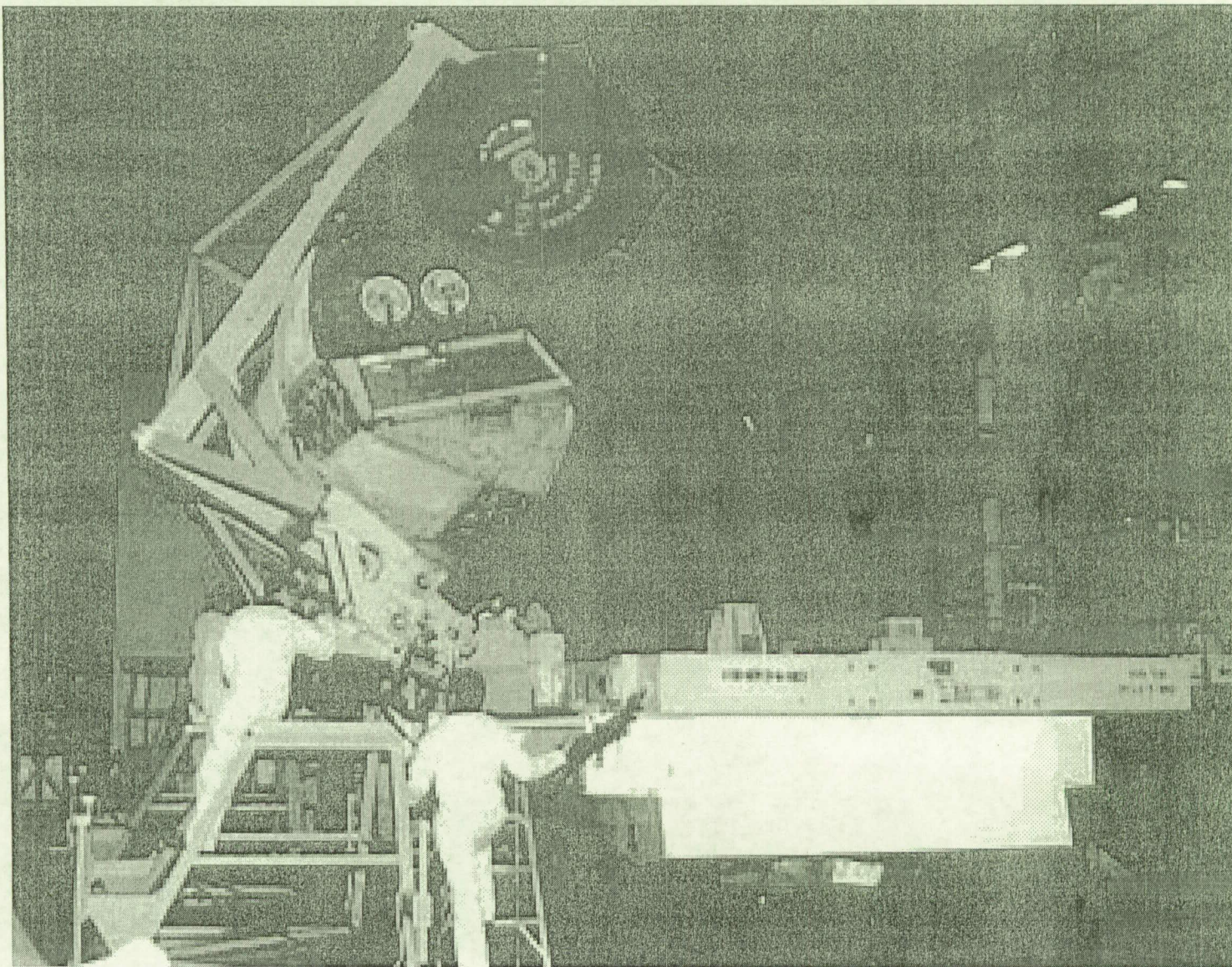
Single Crane Lifts



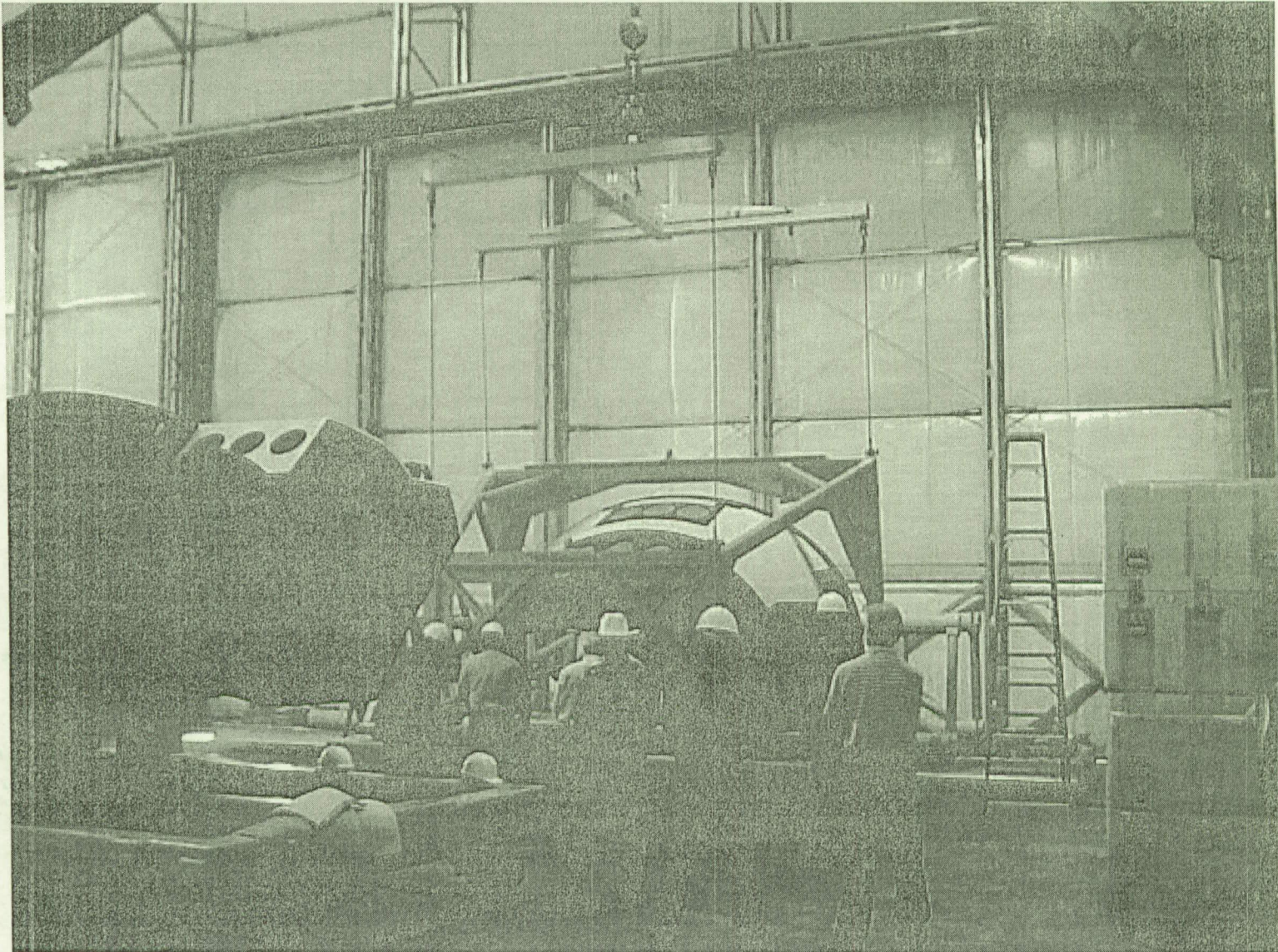
Single Crane Lifts



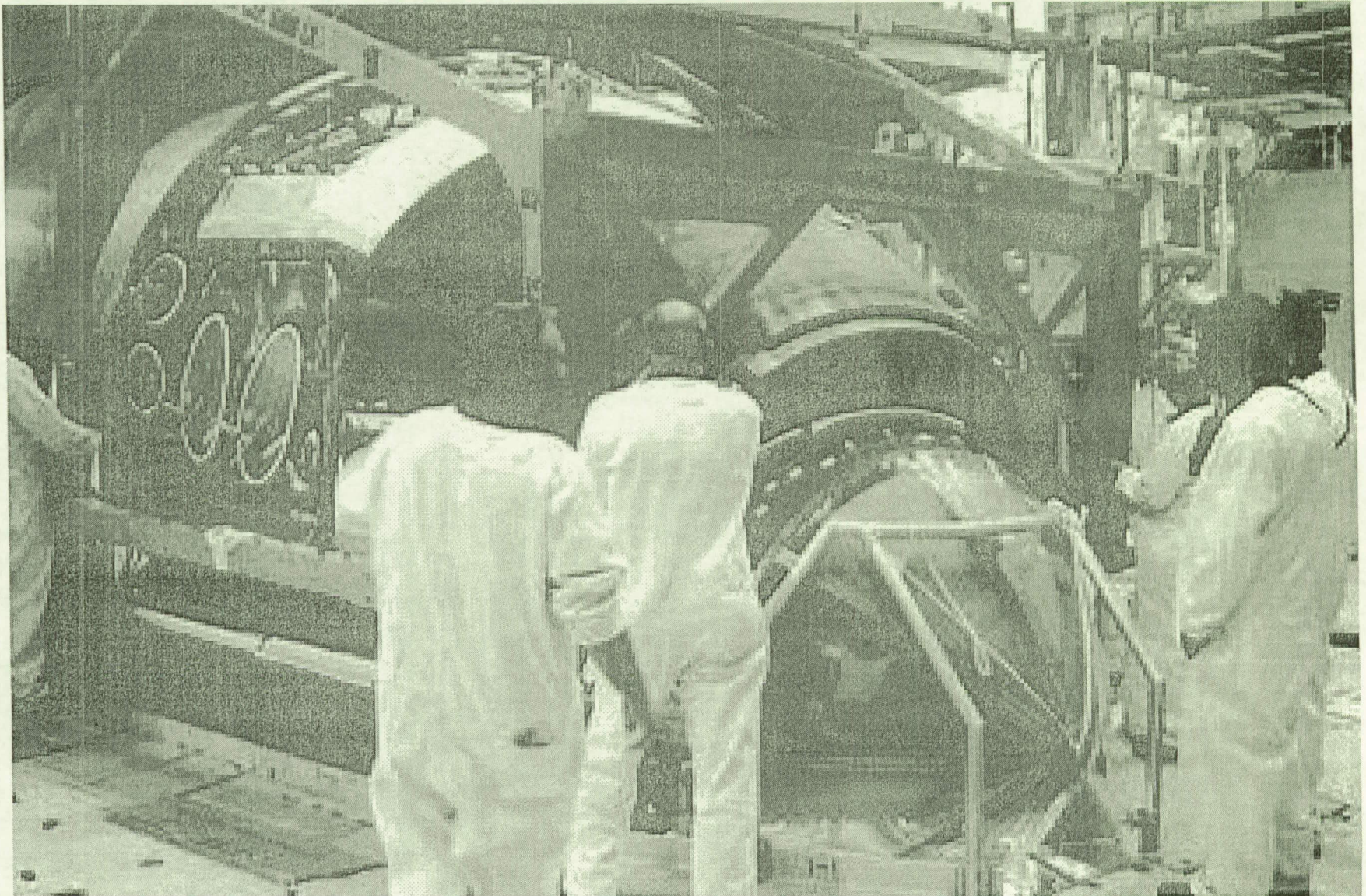
Single Crane Lifts



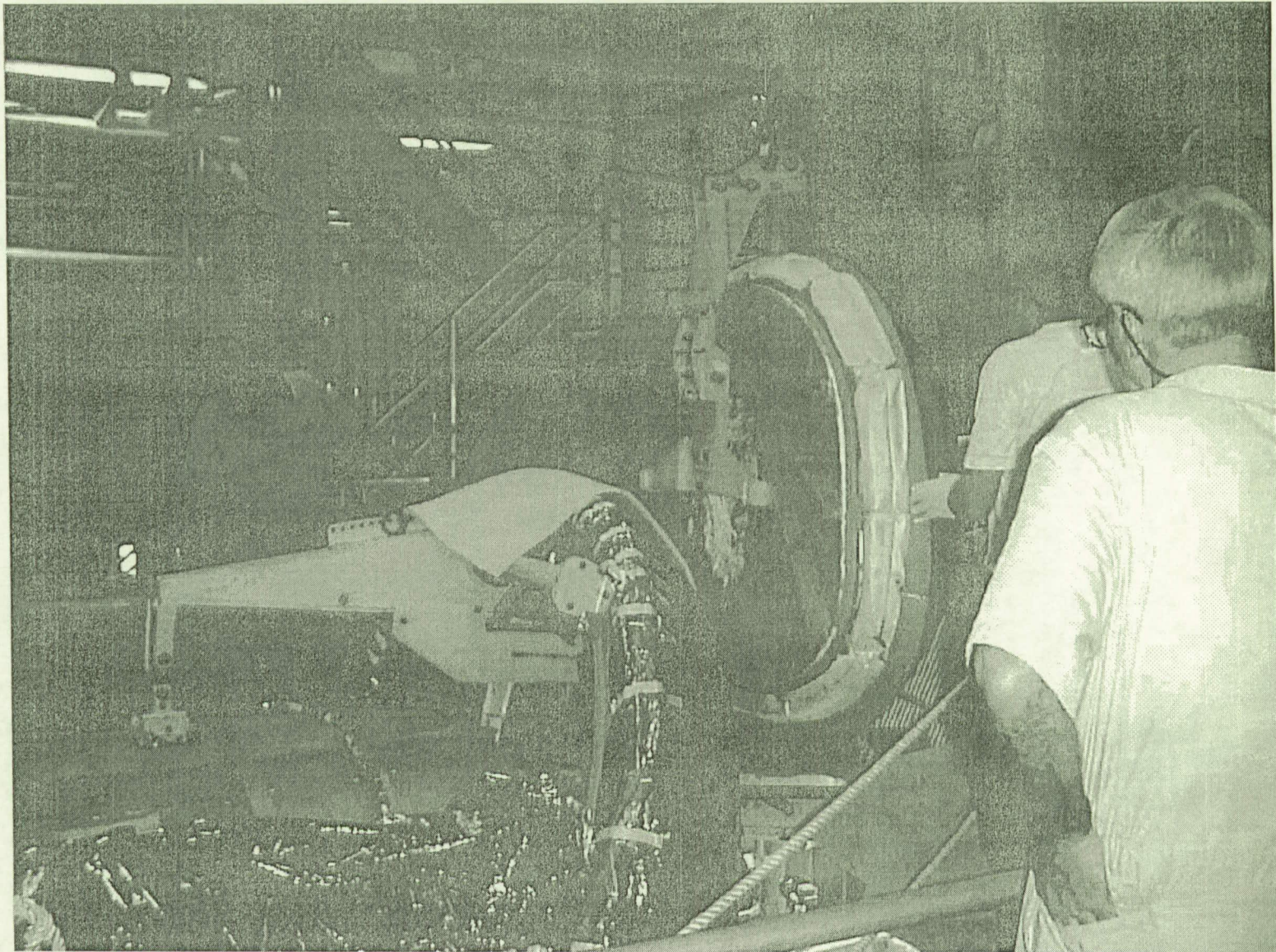
Single Crane Lifts



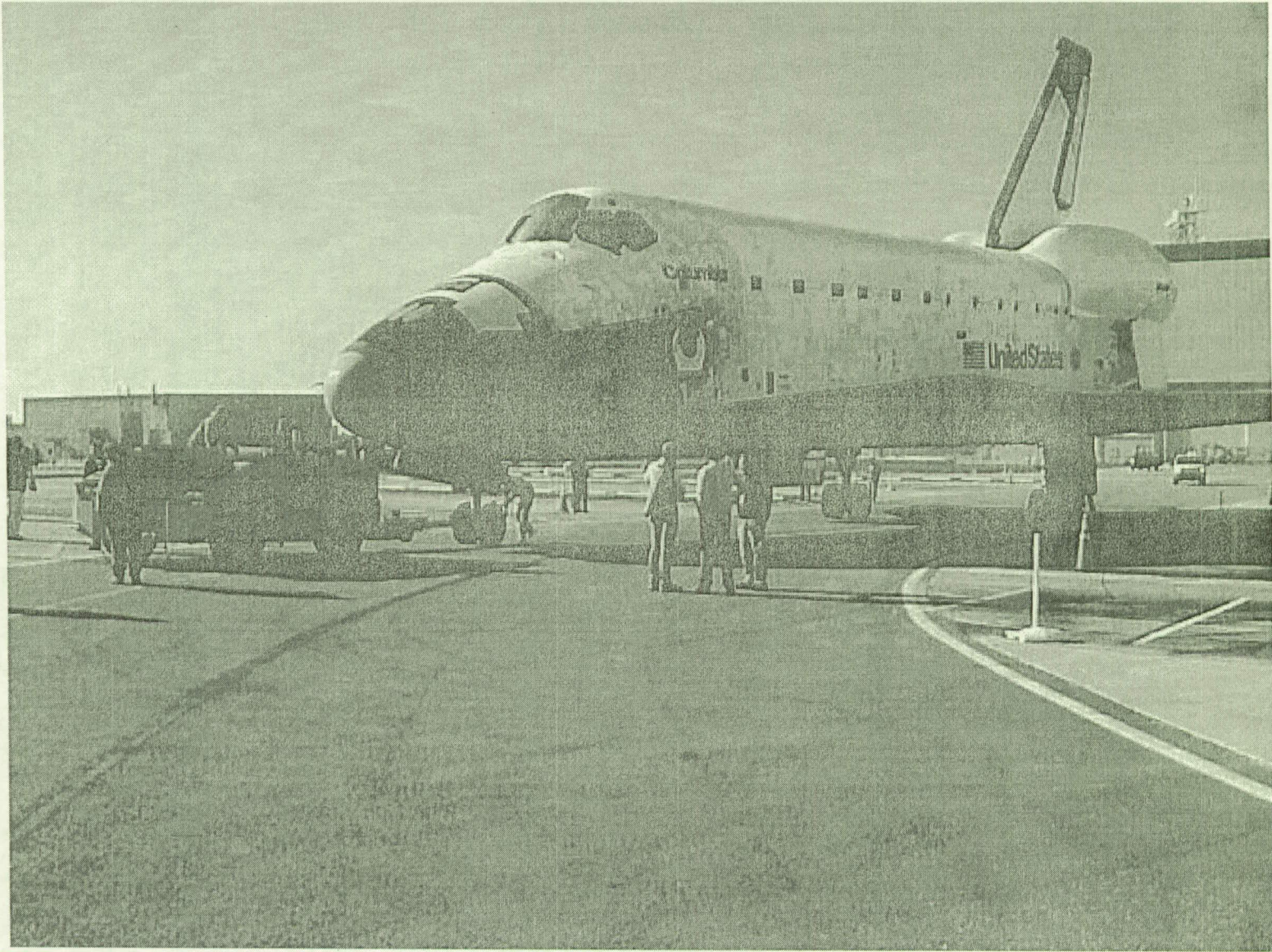
Single Crane Lifts



Single Crane Lifts



Transportation

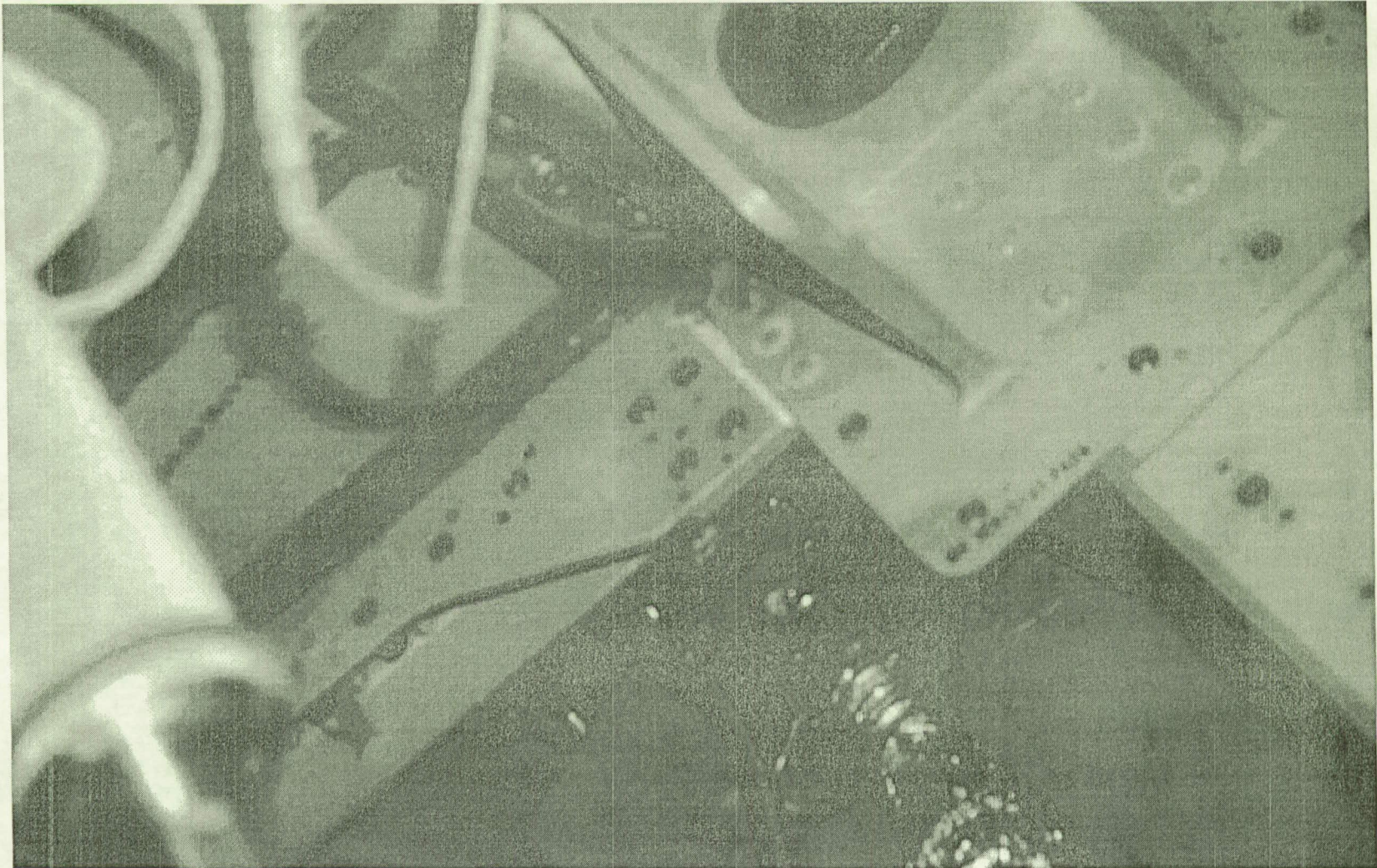


Transportation



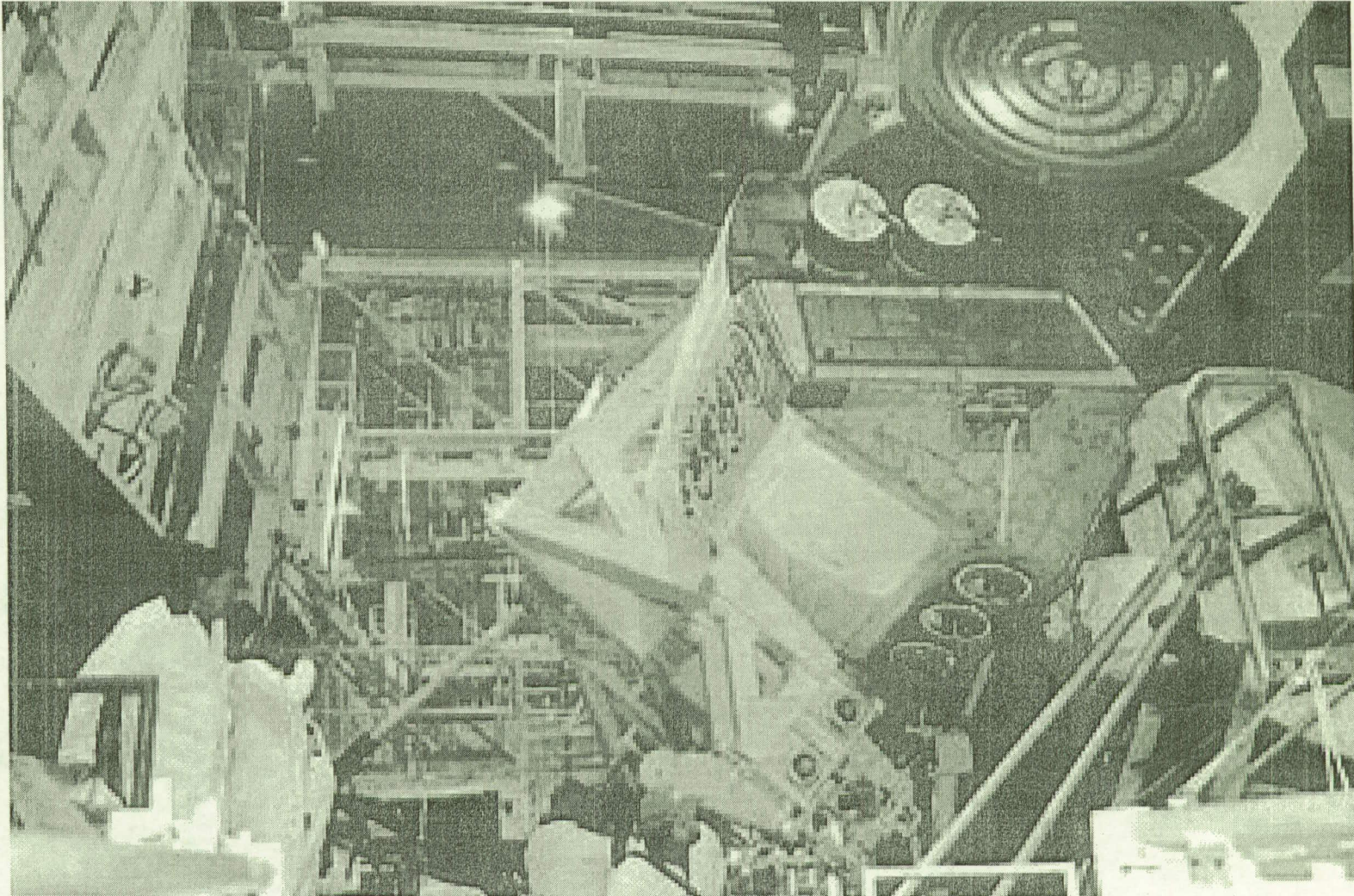
Issues and Incidents

- Observers - Cracked OMS pod line



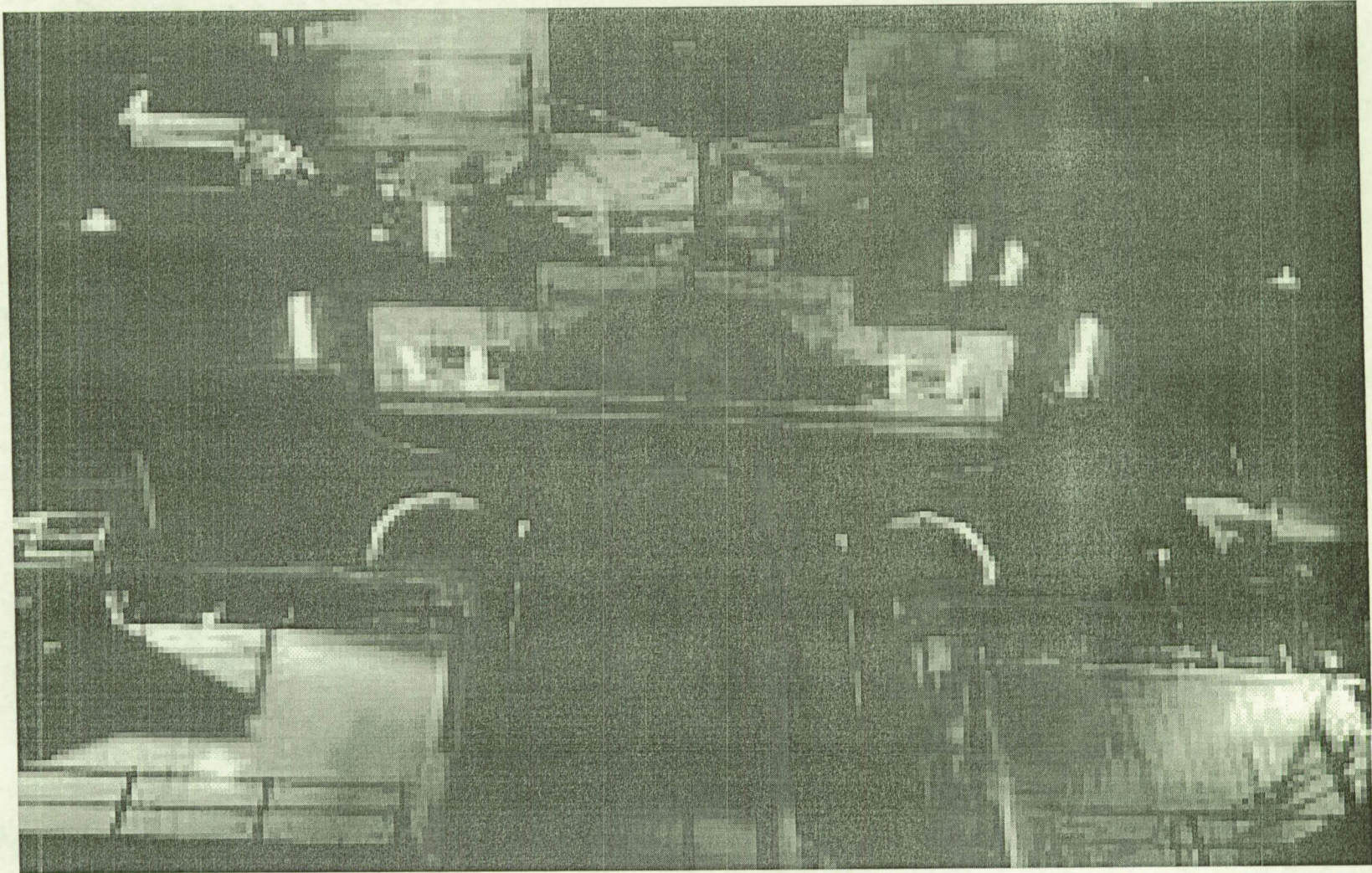
Issues and Incidents

- Unfamiliarity with equipment - Bent OMS pod rotator



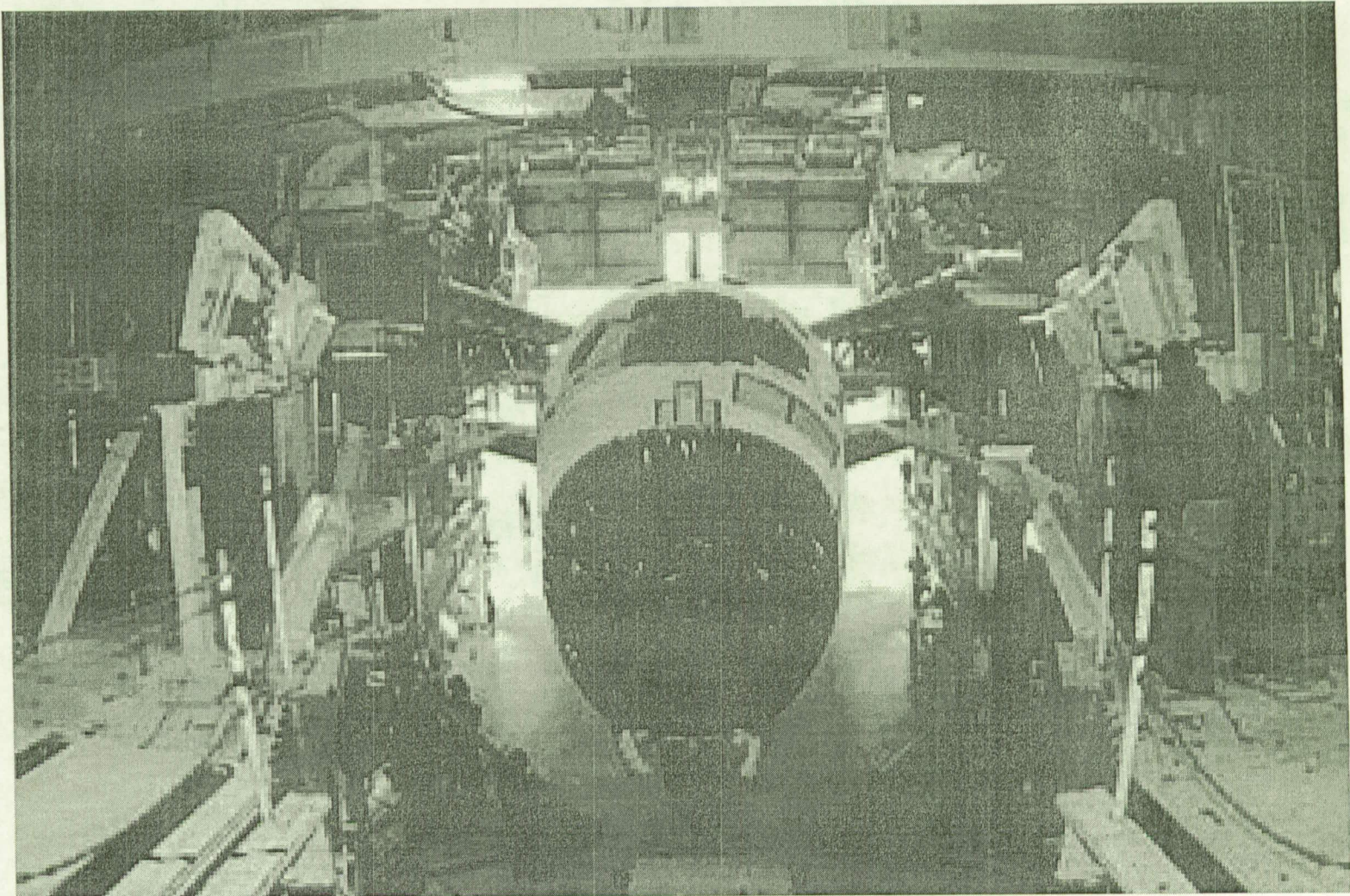
Issues and Incidents

- Infrequent tasks - External tank contacted solid rocket booster



Issues and Incidents

- Communication issues - Orbiter tail hit a platform



Policies

- Operating Procedure
 - Guidelines for moving flight hardware and critical ground support equipment
 - Outlines function of move directors
 - Pre-task briefings
 - Assigning personnel
 - Communication
 - Emergency procedures
 - Use of hydra-set and crane scales
 - Requirements to include in procedures
 - Definitions

Move Director Oversight and Guidance Committee

- Team of experienced move directors, managers and engineers
- Independent reviews of move related incidents
- Proficiency and training of move directors
 - Limited numbers of move directors
 - Review training requirements
 - Conduct move director stand-boards
- Maintains move director website
 - Suggestions, problems and questions are assigned to the committee
 - Lessons learned are posted
 - Move directors can record moves performed
 - Links to all move directors and/or their managers
- Identify and resolve systemic problem in handling processes
- Seek improvements for handling procedures, safety and policies

Move Director Proficiency and Training

- Perform each task several times with certified move director
- Limit number of move directors certified for different tasks
- Two year re-certification program
- Review of infrequently performed procedures
- Intangible qualities
 - Ability to communicate
 - Ability to instruct/train
 - Ability to look ahead
 - Ability to lead and direct team
 - Earn of respect among team members

Questions

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